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THE FIORDS OF NORWAY.

BY

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Nowhere can the geographer find a more intimate blending of land and sea than along the shores of Norway. Islands of rock, an innumerable advance guard, fringe the continent as it fronts those northern seas, and, through protected waters behind them, the Norse mariner pushes his craft as if in his Viking blood he had inherited a knowledge of these mazy labyrinths where the ocean plays hide-and-seek with the mountains. America has in good measure her counterpart where the traveller finds shelter from the Pacific between Vancouver and Alaska.

Behind the island ramparts of Norway the fiords pierce the land, twenty, fifty, one hundred miles; and being a narrow land at the best, one has visited the interior when, indeed, he has scarcely gone more than a day's drive from the sea.

We have made up our idea of a fiord from Norway as offering a type, the finest examples which the world affords. A deep bay, long and narrow, with steep and lofty walls—such is the fiord, an attenuated arm of the sea, shut in by mountains. Often the water is deep, as where, in the Sogne, the plummet drops nearly 4,000 feet. Add 4,000 feet of cliff, in fancy drain the fiord, and you have a cañon almost a half mile deeper than that incised in the Colorado Plateaux.

Scotland has its fiords, but the bordering mountains are not commonly so lofty or so bold; Maine has an elaborately-fiorded coast, and, if we could raise the altitude of her seaward lands from scores,

or a few hundreds, to thousands of feet, we should have, in some measure, another Norway. Alaska is no doubt the best American copy of Norway; for there are found the ocean and the fiord, the lofty mountains and their snowfields, and glacial streams.

We may come nearer home, it is true, and find in the Hudson no mean example. Restore the ancient glacier, with its front at Peekskill, West Point, or Poughkeepsie, and we see the essentials of Norwegian geography. Pile four or five Palisades on each other, rear Storm King to a mile in height, send down ribbons of water from overhanging cliffs, deepen the waters at Newburg to three-fourths of a mile, and sprinkle the lower bay with mountainous islands, skirt the horizon with the midnight sun, and give the white man a thousand years of history, and you will have a Norway of your own.

This article will deal with geographic conditions rather than physiographic origins; yet a few words must be said about the causes of this indented shore-line. Some things we safely know. Here are mountains of crystalline rock shaped by the agents of destruction during long periods. That the coast has been upraised is plain to any one as he sees the elevated beaches and shore-cliffs, removed from the present operations of the sea. That the elevation just named represents but slight recovery from profound submergence seems equally clear. The pattern of the fiords is too intricate and tree-like to be due to deformation, shaping structural valleys; indeed, the foldings and crushings are so ancient that structural valleys would long ago have disappeared. Even the historian Professor Freeman speaks of "antler-like fiords," and thus points to the common-sense conclusion that these are river valleys made tidal by "drowning." Given mountains, plentiful rainfall, deeply-incised valleys and submergence, and we account for present arrangements, including the myriad islands isolated from the continent as the waters closed around rocky headlands.

The case is, however, not quite so simple; for many of the fiords deepen enormously after we pass their portals. Under the doorways, at moderate depths, are sills of rock or rock waste; then come long and narrow abysses until the water shallows again at the head of the fiord. The water in the outer end of the Sogne is usually less than 600 feet deep. Twenty-five miles from the entrance the depth is almost 4,000 feet. The Hardanger fiord is 1,500 feet deeper within than at its seaward end. This condition is repeated in Scotland, as where Loch Etive narrows at Connal Ferry and the rock-sill is so near the surface of the water that the ebbing tide pours over it in a boiling torrent. Within are 420 feet of water.

Raise Norway and long, deep lakes would replace the tidal waters in many fiord valleys. Ordinary streams do not scoop out such basins, and we seem driven to glacial ice, and to accept good measures of glacial erosion.

The glaciers are here, and the Justedal, covering 347½ square miles, is still a respectable ice-sheet. This and other ice-fields send down glacial tongues into the fiord valleys. These tongues have filled the valleys with ice of great depth, impelled by headstreams of ice pouring down slopes of exceptional declivity—in short, if we find the possibilities of glacial erosion anywhere we find them here. An English geologist has well observed that if the ice of Greenland were much reduced, that land would be as Norway is now. In former times, when Norway was as Greenland is to-day, the ice could exhibit its full power.

All the characteristic doings of ice are here—graven rocks, rounded domes, moraines, glacial cirques, and hanging valleys. These last, so fruitful in recent years in discussions of glacial erosion, seem more the rule than the exception. Everywhere are matured side valleys entering the trunk fiord valleys at heights of 300, 500, or 1,000 feet, and their streams have not had time to produce a recession of the falls whose waters leap abruptly into the fiords. Even the valleys joining the trunk valleys at tide-level would show vast discordance if the waters were drained out of the fiords.

All these conditions, with the profound basins lying within, as already described, force us, I think, to the conclusion that the deepening of these old river valleys is due to ice; and I believe this notwithstanding the magnitude of the work and evidences of slight glacial erosion in some parts of the fiords and of the valleys which succeed them at their heads.

In these very valleys, curiously near the head of many fiords, are deep lakes, separated from tidal waters by a short barrier of waste or of bed-rock and extending much below sea-level. These lakes are moraine-dammed, or in rock basins, and separated from the fiords, as the fiord lakes would, in case of elevation, be separated from the open ocean, by barriers of rock or rock-waste.

Norwegian scenery is ever recalling that of Switzerland, with this difference, that one can see so much of the Norse landscape from the deck of a ship. For days one follows the base of cliffs far higher and grander than those which arouse admiration for a short hour or two while passing the Highlands of the Hudson. The Swiss mountains are loftier; but they scarcely seem so, because their more

ancient northern neighbours rise abruptly out of the sea. As in Switzerland, the fiord mountains, rugged as they are, cannot dissociate themselves from human life.

Follow the Hardanger northward toward Odda in the early morning. The mountains are 4,000 feet high, and on the steep lower grounds are dark forests and farms. Shifting cloud-masses brush the high slopes revealing, as they pass, bare brown cliffs, hanging glaciers, and fields of snow. Small streams tumble down the cliffs in ribbons a thousand feet long; and while the air is chilly with surrounding snows, the houses are many, with adjoining patches of meadow and small plots of potatoes, here and there a white church, and all looking down on the only highway, the waters of the fiord, here a hundred miles from the sea.

The Naero Fiord, a southern arm of the Sogne, meets all one's expectations of loftiness, of depth, of seclusion and gloomy grandeur. At every turn it would seem that the end has come; but in the nick of time a new vista is disclosed as one draws nearer to the heart of the mountains. Now the rocks standing sheer overhead four-fifths of a mile show gray and black and verdureless, and then appear the deep-green coniferous trees clinging to the cliffs or clothing the tops of vast buttresses that support the giant walls. Between these lofty buttresses are narrow lateral gorges or spreading glacial cirques, which give unending variety to the cliff forms that reflect themselves in the still, deep waters below.

A small ship may anchor its own length from the head of Naero Fiord and be in 20 fathoms of water. The path that leads by the edge looks into waters so abruptly deep that only expert swimmers could afford to make a misstep. Above, the rocky precipices are as various and delicate in expression as they are lofty and magnificent—sheer black cliffs alternating with slopes of forest green, of soft grasses and luxuriant trees, and within single reach of the eye not less than eight bridal veils of spray mark the lines where the melting snows on the plateau above pay their tribute to the sea.

In sailing up and down the fiords the physiographer observes the scarcity of rock waste—a strange fact, in view of enormous and prolonged destruction of the mountain masses. Where is the talus and where are the alluvial cones of giant size that ought to be here? The answer is in the steepness of the fiord walls. The waste of to-day has gone down into the bottom of the fiord, while the earlier débris has been pushed out to the borders of the ocean by the ice, and the rock-flour spread by the waves on the sea-floor. But once pass the head of a fiord and traverse its valley and the accustomed forms re-

turn—lofty taluses and great cones and fans from the ever-dissolving mountains.

The tales of travel and our preconceptions of more northern latitudes have distorted the common ideas concerning Norway, making it cold, steep, and repelling, save as the tourist or the man of science seeks his ends in midsummer. There is more verdure than one has thought, not less of rocky grandeur, but good measures of refinement and beauty in the landscape also, a country hospitable and gracious in its display of sublimity and power. Wherever there is found a square yard of glacial waste or weathered rock, there some seed gains a place, the prevailing moisture atones for the poverty of soil, and a tree waves its branches above the waters interlocking with its fellows to cover the nakedness of these northern mountains.

Everything east of the Mississippi save Niagara seems trivial beside the waterfalls of Norway—cold product of ice and snowfield, falling in silver streaks through dark-green woods and playing with the clouds which so often hang low in the abyss. It is apart from my purpose to say more of a descriptive sort. Let us ask what the geographic conditions are which Norway offers to human life.

First is the all-including sea. One cannot go far from it in that long and narrow land. And every land-locked belt of tidal water opens into that uncertain region where the Atlantic doubtfully merges into the Arctic seas. It is along the fiords that the people live. If they go inland it is by the unsubmerged parts of these great valleys. But more often the call has come from the ocean, and from safe harbours the Norseman has gone out to sail, to fish, to trade, to discover, to fight, or to find new homes. Whatever tonic of opportunity the sea offers, whatever impulses lie in its music—all the imaginings of world-opportunity that come over its waves from beyond the horizon—these have been the Norseman's heritage and the staple of his daily life.

Mountains are the second condition of Norwegian life. Indeed, the country is all mountain, with some parts reduced more nearly to base-level than others. The heights are comparable to the White Mountains, the Adirondacks, and the Southern Appalachians; but in their declivities and barrenness, in their snow and ice, they are Alpine rather than Appalachian.

Great Britain is most analogous of the countries of Europe; yet how diverse—her mountains less high, long free from perpetual snow or glaciers, and bordered by plains where the people and the sources of national life are found. Great Britain has sea and mountains; Norway has these only, and her people must be mountaineers,

sea-faring though scores of thousands of them be. If you can imagine a composite of Switzerland and Holland, each bereft of its lowlands, you have left a kind of Norway.

A third geographic condition is climate, and we may look long to find a better case of agencies joining to produce it. Here we have high latitude, with its long winters and short summers. But we have also the proximity of seas well tempered by drift of more southern waters, and we have wide range of altitude. The mean temperature for January at Stavanger is 34.7° ; while for July the mean is 55.0° —a climate not excessively severe in winter and comfortably warm in summer. Norway inland is, indeed, colder; but the fiord waters, with their great depth, form a reservoir of heat and life which it is hardly too much to say has made it possible for the land to have a history. There is little in the fruit and vegetables of temperate latitudes which the short but life-giving summer does not produce; and Molde, on the north shore of its fiord, its slopes facing the southern sun and looking out across the waters on a splendid panorama of peaks and snows, is famous for its roses. Could we imagine the fiord topography transferred to the tropics what should we see? We can picture the glory of tropical vegetation on those rocky walls, but it might be less than the majesty of the dark-green firs. We could not have the snows and waterfalls unless the mountainous plateau were vastly higher, and these secluded valleys would be insufferably hot. But why imagine, when fiord lands, at least in their typical display, seem confined to higher latitudes and to the fields of glaciation?

Norsemen get on well without a tropical sun, ripen wheat within the Arctic Circle, hops at Loffoden, and cherries in north latitude 66 degrees. Doubtless psychological effects not measurable in a laboratory have accumulated through centuries of inheritance under the subtle influence of the absence or presence of light in the long winter nights and unending summer days of that land. The summer sun sets at no early bed-time and rises long before the most enterprising farmyard monarch in America sounds his call to day. And in the hours called by custom night the sunset glow follows the horizon and mingles with the dawn.

Geographic position is the next element in Norwegian life. Peninsular as she is, she is more isolated from the continent than insular England. Yet she has had her hand in some true way in the affairs of Europe, because her fiords led out into the "broad, public highway of the Almighty." Her people have been less set apart than the mountaineers of Switzerland, even though the Alps have been in the track of great nations for twenty centuries.

The final item in the geographic conditions of the Norsemen's land is the limitation of its resources. Just so much can you get out of it and no more. Whittier writes—

The frozen fiords were fishless,
The earth withheld her grain ;

and Björnson in plain prose reveals the habit of the farmers to expect one bad year, and sometimes two, out of every five. The stones and trees make it a burden to open new land, and on many slopes it is hard to keep the thin soil at rest. The wild torrents from the mountains have to be controlled where they cross the fields, and on such grounds primitive hand labour must ever be done.

The population, therefore, cannot pass a certain point, and is to-day in density the smallest in Europe—16 to the square mile, though even this is large when we remember the lonely wastes of most of our Cordilleran States. A sturdy type develops here, but cannot multiply, and the corollary is overflow, emigration. Thus it has ever been, from mediæval to the latest modern day—the Viking of old and his more quiet but equally blond sons of the twentieth century.

"I do not think," says Björnson, "there is any other nation which travels so much as my countrymen—as sailors to all parts of the world, as fishermen on their great fishery and whaling expeditions, as artisans, students, or men of science seeking knowledge and experience abroad, as merchants seeking new markets, and last, though not least, as emigrants."

Such is the environment of man in this northern land, with rugged mountains, omnipresent sea, circumscribed resources, and isolation which has nevertheless invited fellowship with the world.

Let us turn to Norwegian industry. Think of a country that has but 740 square miles of ploughed land! More, indeed, might be tilled were it not needful to keep it in meadow. In some places the Norse farmer has actually carried back to overlying slopes the soil which rains, in the process of tillage, have swept down upon the lower fields. No crop seems more luxuriant than potatoes, seen in garden patches, planted in rows not more than twelve or eighteen inches apart, and covering the ground completely when midsummer has come.

No agricultural process is of more interest than the haying. The dairy is the staff of life, and scythes, like a small sickle or a corn-cutter, are carefully wielded over rough and hummocky ground where the American farmer would turn loose his sheep. Yet in the better meadows the growth is rank and full, not tall, but soft, thick,

and fine, and matting so close that there is added reason for drying, as the people do, upon hurdles or trellises. Much too moist are the air and soil to cure grass in the way of other latitudes. It would become fertilizer rather than forage if left to cure on the ground. On the hurdle, its fine texture turns the rains effectively so long as sun and air need to continue their work. Thus haying proceeds along the fiords, while the saeter, the mountain dairy, is in operation on the heights, whither the cattle and the dairy maids have migrated for the summer period.

Sometimes from these heights a taut wire is stretched to the homestead below, down which, three thousand feet or more, the products of dairy and forest are transported. I did see haycocks at Oie in American fashion, and there are mowing machines in Romsdal; but, in great part, the cow standing docile in a small boat crossing the lake at the head of the Hardanger is a type of the primitive life of man and beast on the farms of Norway.

Let me classify the arable lands along the fiords with reference to their origin. Some fields are due to differential weathering, where rough and craggy ridges come down the mountain-side to the water's edge, and between them, on the waste of softer rocks, are irregular lanes of fresh green flecked with white cottages. At the heads of the fiords deltas may be found, though the depth of the water makes the land-growth of the delta small. More favourable are the heads of the lakes for delta expansion; and where a lake intervenes but a short distance from the head of the fiord it pockets the sediment and sends the waters of the valley into the sea free from waste.

As in our own northern States, filled lake-basins abound, with meadows and fields. Other physiographic forms whose surfaces are used by the farmer are the alluvial cones, slopes of talus, and the ordinary flood-plains. There are delta terraces also, marking the level of lateral discharge into the fiords in the more submerged state of the region; also glacial moraines, sand-plains, terraces, and valley trains.

Another product of differential weathering—or, perhaps, sometimes of differential glaciation—is found in the lofty shoulders of rock, on which, far above the sea, on dizzy perches, farms are placed, seemingly inaccessible. The floors of matured lateral valleys also, whether now hanging or at the present base-level, offer another foothold for the home-maker and the tiller of the soil. The elevated strands, as at Aalesund and many points in its neighbourhood, contributed soils to the land in the time of their uprising.

I have consulted no statistics to learn the relative importance of Norwegian industries. But the commerce is not small; for though the land has not much of its own to transport, its people take rank among the great carriers of the world.

Perhaps the railroads are the least important factor in transportation, and they seem, even prospectively, of less account than the Government highways, built with infinite toil, under the direction of skilled engineers, inward from every fiord head, toward the capital.

The water is the Norse road: children go to school by it, wedding parties go to the church over it, the farmer goes to market upon it. Mail steamers thread the watery mazes everywhere, and where they cannot come up to a pier, a small boat puts out at morning, or noon, or in the twilight of the night, to send to Bergen or some far-away port tubs of butter or boxes of fish; and if the fish is too long for the box, it is small matter, for the tail sticks out, while the cover is nailed down, and somebody is fed from the nourishing waters among the mountains.

Old and young are accustomed to the water. The children might as well have been born upon it, so much at home are they with rowing craft; and I have seen young girls with unconcern gathering berries on the brink of a precipice. Neither young nor old have learned to be "afraid of that which is high"; they take their country as they find it, summer sun and winter snow, and make the remotest strand the centre of the world, though sunk so deep in the mountains as to seem lost to the outer life.

The Norseman has never failed in his mastery of the wild nature in which he lives, and the inheritance of a stern and stormy zone seems to appear even in the slow farmer boy, who, with his yellow horse and harness of rotten cord, runs you down at breakneck speed along the edge of cliffs, scaring you to desperation, but bringing you safe to the foot of the mountain. No doubt a cautious New England driver would break the harness, overturn the vehicle, and bring you to disaster. There is something to warrant Boyesen's picture of the "tall, blond men with defiant blue eyes who obeyed their kings while they had confidence in them and killed them when they had forfeited their respect."

There are harbours everywhere, and every fiord mouth has been for ten centuries a challenge to see the world. It was inevitable, therefore, that Norsemen should breathe the ocean air and go forth. Their errands have accorded with the stage of civilization which, century by century, they have attained. And they have thus crossed

the sea for discovery, for robbery and conquest, for commerce and for new homes. They are strangers to no land where ships may come ;

The wolf beneath the Arctic moon
Has answered to that startling rune;
The Gael has heard its stormy swell,
The light Frank knows its summons well;
Iona's sable-stoled Culdee
Has heard its sounding o'er the sea,
And swept with hoary head and hair,
His altar's foot in trembling prayer !*

Nearly all the towns of Norway are on its fiords, and often at their heads. Such are Christiania, Bergen, Trondhjem, and smaller tourist places, as Odda, Gudvangen, Merok, Helslyt, Naes, and many others. On or near the open ocean are such busy fishing centres as Aalesund and Christiansund.

With farming and carrying, fishing finds a normal place; for thousands of men till the soil in the summer and man the cod fleets in the winter months; or the women may manage the farm, maintaining independence and vigour while their husbands are far off along the coast courting danger and gathering the harvest of the seas.

Not all the fishing is done in distant seas; for on the dusky water of the fiord in a summer night, under the shadow of the inclosing mountains, you may descry a little fishing fleet, each boat bearing an oarsman and another standing with the line. The Norwegian will fiddle at the top of the salmon stairs, and apparently await his catch with the same philosophy which belongs to the fisherman of all times and all lands, and when one visits the fish markets at Bergen on Saturday morning and sees on the public square the quietly-chaffering throngs of common people, and looks over upon the small boats that crowd the wharf, filled with innumerable fish, he has perhaps seen the most typical exhibition of human affairs in all Norway.

Agriculture, fishing, and commerce—these are the resources. Agriculture is at its limit until the mountains waste away or an up-rising continent lays bare the submerged ruins of northern Europe. The seas are fruitful, and a stable but moderate wealth will always be drawn from them. Perhaps, too, Norway can own more ships, and lure thus the world's money to support a larger population. One thing she could do if she could get at the raw materials of manufacture: her falling waters would propel the wheels of all the

*Whittier's "The Norsemen," a poem on the visit of these mariners to New England.

civilized industry of Europe and America if they could be utilized. Perhaps we shall have no regrets if somewhere nature cannot be put in harness. When Niagara has gone dry and our Atlantic States are no more the home of unpractical and idealistic sentiments about the natural world, an increasing number of unpractical men and women will go over the sea to find yet a land where nature is unspoiled and where syndicates have not acquired title to the rights of the soul.

Will Norway lose her charm for the lover of natural scenery? And will her people be brought into monotonous uniformity with the conventions of modern civilization? No measure of natural splendour will eliminate the shallow tourist and bring to those great scenes only those who are prepared to appreciate them. There is no law to forbid the American tourist from rushing on deck as you are sailing in the early morning up that fine watery path to Odda and crying in your ear, Where is the end of this "ford"? and, What is there to do at "Oddy"?

Edmund Gosse, revisiting Norway after a quarter of a century, saw many changes; but he did not think the land could easily be spoiled. Much of it can never be anything but wilderness; for the "spirit of its landscape is as untroubled by satiety as Shelley's skylark." But Norse character—will it be spoiled? It is a surprising experience to pull up at the docks of a city of 70,000 people, let down the gang-plank, and see many hotel porters and cabmen, in perfect and pleasing silence, refusing, even if you wait an hour to come on shore, to solicit a job at your hand. Forty years ago it was the same, and sturdy hackdrivers smoked their pipes with a philosophical indifference not easy to understand. Gosse explains it as a kind of shy defiance, shown by men who will not be patronized but will stand on their native dignity.

With this simplicity are many tokens of modern life. There sounds the gong of electric cars, and the sign "holdplatz" abounds. There is machine typesetting in Trondhjem; and I have not heard that there are strikes among the operators. Aalesund was burned, and its wharf is as busy and dirty as any latitude can show; while a professional diver goes up and down, laying a foundation for a new pier wall. At Bergen is the ubiquitous "Berlitz school"; and the Mutual Life of New York, "Stiftet 1843," is announced by a sign of twenty-four letters in one word, which would baffle any Yankee tongue. The dog looks into a gramophone, the "Circus Norbeck" goes on in its career of popular amusement, and the Grand Café tries our notions of primitive simplicity, with its gilded ceiling,

dress coats, orchestra, its many courses, numerous wines, and parlours with palms and paintings.

But the influence of the land will not fade. Norwegians cannot become a race of effeminate men. It has been said that to name Björnson in any assembly of Norsemen is like running up the national flag. His own lines have become the national song, and such they are because in them Nature sounds her call—a call which must fill the native ear and re-echo in the heart :

Ay, we love this land of ours,
Crowned with mountain domes ;
Storm-scarred o'er the sea it towers
With a thousand homes.
Love it as with love unsated
Those who gave us birth,
While the saga-night, dream-weighted,
Broods upon our earth.

Here is a people wonted to solitude, each household turning up the stony soil beneath the overhanging mountains, and often they must sail their boats up or down the long fiord to find a neighbour. Peaks, glaciers, snows, clouds, and blue waters have written themselves in unconscious lines upon the heart, with impressions too deep to be effaced or forgotten. They are an intelligent people, and know the history of their lonely North. Still they write the reminders of the past upon the ships that sail to-day, and the breath of the north wind is not far away, even in busy Bergen harbour, when you read—King Erik, Kong Halfdan, Vikingen, Raftsund, Sverrie Sigurdsson.

Thousands have made their home over the sea ; but they do not forget. The spell of the land is on them—the aurora, the long summer day, the calm winter night, the small tillage and frugal ways, the mountains, waterfalls, and the sounding sea : these join in reactions which no chemistry can follow to turn the Norsemen in wild fancy, if not in bodily presence, to the land that bore him, reared him, and made him her own :

There's a land where the snow is eternally king,
To whose valleys alone come the joys of the spring ;
Where the sea beats a shore rich with love of the past,
But this land to its children is dear to the last.